

# Computerization of the Medical Quality Improvement Program at a Chronic Care Hospital

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## ABSTRACT

Utilizing micro computer technology and a relational data base manager we have successfully computerized the Peer Review functions of the Medical Quality Improvement program at Monroe Community Hospital, a Chronic Care Hospital. The developed computer programs enhance patient care by focusing on potential practitioner errors. The programs allow for trend analysis and identify the disciplines to whom problems have been referred. This effort has pointed to the need of a standardized lexicon to describe and catalogue potential practitioner errors.

## INTRODUCTION

Hospital Medical Quality Improvement (QI) programs are mandated by state and federal regulations and are required by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). Such programs enhance patient care, provide feedback to practicing physicians about their performance, and serve as a risk management tool. The computerization of such a program would allow identification of patterns of medical practice where improvement could be targeted.

In 1991 we revised our Medical Quality Improvement program to meet the JCAHO standards and began investigating the desirability of its computerization. Central to our approach was an investigation of the lexicon used by our manual program, identification of key words, and the use of existing data bases to capture demographic data. We have briefly presented this experience [1].

## TEST FACILITY

Monroe Community Hospital is a governmental facility located in Rochester, New York. It has a 39 bed certified hospital, of which 18 are classified

as acute care and 21 are designated for rehabilitation. There are 566 nursing home beds, of which 354 are designated as RHCF-1 (SNF) and 212 are designated as RHCF-2 (HRF). An Out Patient Department and Operating Room further enhance the capabilities of the facility. The Hospital units are designated as a Chronic Hospital by Medicare. This designation means that the prospective payment system (DRG) are not used for reimbursement and this data source is not available for quality screen.

The Hospital is affiliated with the University of Rochester School of Medicine and Dentistry and serves as a teaching base in Geriatrics and Chronic Disease for Physicians in Training (Medical Residents and specialty Residents) as well as for medical students.

Demographic data cannot be translated from the hospital's billing system into micro computer technology. Relevant patient demographics for this program were captured from the RUG-II data base, a prospective payment system for New York [2].

## MEDICAL QUALITY IMPROVEMENT PROGRAM

The Medical Staff organization is Non-Departmental, thus all practitioners (dentists, physicians, psychologists, nurse practitioners, physician assistants) are monitored by the Medical Quality Improvement program independent of their department or geographical area. The program is managed through the Professional Service Committee (PSC). The Chairperson of PSC is appointed by the Medical Board. PSC reports to the General Medical Staff on potential quality issues, to the Medical Board on matters of policy, and to the Governing Body. Ultimate responsibility for the program rests with the Medical Staff through its Medical Director.

Potential quality issues are referred to PSC through a variety of mechanisms. It may choose to act independently, develop a task force, or refer to its subcommittee, the Peer Review Work Group (PRWG). PRWG consists of three practitioners who in rotation review potential quality issues monthly, and submit their recommendations to PSC. Final decision of a quality issue is made by General Medical Staff.

The QI "loop" is closed by formal notification of the practitioner of any potential errors. The practitioner has the option, after such notification, to submit further information and request reconsideration. All quality determinations are placed in the Practitioner's Profile for subsequent review by the Credentialing Committee.

### QUALITY DATA SOURCES

PSC reviews departmental reports from Radiology, Respiratory Therapy, Medical Records, Laboratory Services, and Dental Services. These data sources have not yet been computerized and are planned. Standing facility-wide committees which report to PSC include Infection Control, Pharmacy, Therapeutics & Nutrition, Utilization Review, Risk Management, and Safety.

Patient-centered reviews are the Screens and Monitors listed in Table 1 which are supervised by PSC. Potential practitioner errors in these Screens are identified by Quality Improvement Nurse Specialist, except for Mortality Review which is performed by a single practitioner utilizing an encounter form. The multiple sources reporting potential quality issues pose a tracking and collating burden for the data. Its computerization would enhance the program.

**Table 1**  
Screens and Monitors

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Generic Reviews
Sentinel Health Event
Surgical Case Review
Mortality Review
Ad Hoc Referrals
Drug Utilization Review
Chart Review for Clinical Pertinence
State Incident Reports

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### ANALYSIS OF INFORMATION FLOW

We standardized Peer Review by adapting the structured formats developed by Vacanti and Vitez for Quality Assurance programs of anesthesia departments [3]. In brief, the potential error is identified, and the chart is made available for review by three practitioners who independently arrive at a determination on the quality issue utilizing a logical flow encounter form. The encounter form has four sequential main identifiers: No Error, More Information Needed, Error in Vigilance, and Error in Medical Judgment. The potential errors are further subclassified into the attestations listed in table 2.

**Table 2**  
Potential Error Attestations

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Vigilance
Documentation
Procedure
Communication
Policy/Guidelines
Supervision
Medical Judgment
Inadequate Knowledge
Inadequate Data Base
Data not Utilized
Hypothesis
Therapy
Professional Conduct
Other

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The encounter form subsequently flows to an area that allows identification of others involved which allows communication to other disciplines. For example, administration of a medication to a patient with a known drug allergy would constitute an error in Medical Judgment, with an attestation of Data Base Not Utilized. Others involved would include Physicians in Training (Medical Residency Staff), who write orders under supervision of the attending physician. The Nursing Staff and the Pharmacy would also be identified as being involved in this potentially serious error.

Finally, the encounter form has a section for free text which allows reviewers to comment on the potential error and any confounding circumstances.

## COMPUTERIZATION OF MEDICAL QUALITY IMPROVEMENT

The above description of the program, and the State and JCAHO requirements for record keeping for credentialing of practitioners pointed to the need for three key files: (1) PSC HISTORY, which would sequentially stack the quality issues and the determination by General Medical Staff, (2) PSC REFER, which would sequentially stack those quality issues that PSC had identified that might involve other disciplines, and (3) MORTALITY REVIEW, which would stack the information on expired patients. The computerization of MORTALITY REVIEW has recently been accomplished, and will not be discussed in this communication.

To facilitate keyboard entry, a LOOK UP TABLE containing the location of the potential error, the referral source, the attestations of the potential errors (Table 2), and the identity of disciplines commonly referred, was created as a file. We recognized the desirability of structuring potential errors, but initially we had insufficient data to develop an error lexicon.

During the first year of the computerization process, the potential errors were input as free text, and subsequently grouped into a standardized lexicon that is still under investigation. The lexicon was standardized by choosing a two or three letter "leader", followed by a specific description. For example: H&P: Inadequate pre-operative exam, or H&P: Failure to document a neurological examination.

It was apparent from this analysis that a relational database model, utilizing Personal Computer technology would be a cost effective approach. Our programs were written in dBMAN (Versa Soft), which is an XBase language whose data structure is compatible with dBase III and IV (Borland International).

### FILE STRUCTURE

The structure of PSC HISTORY is listed in Table 3 and the fields it shares in common with PSC REFER are starred (\*). The Code field is PSC reference number, coded by year, month, review number. When more than one practitioner is involved in a potential error, the same number is kept, and a character is added at the end (PRWG-92-05-01A) which sequentially identifies the

practitioner(s). The Reference Number field is used to capture external numbered communications, such as State Incident Reports that PRWG or PSC may review. Four logical fields (PRWG Consensus, PSC Agrees, PSC Consensus, and General Medical Staff Agree) allow tracking of the degree of controversy that may surround any specific determination.

**Table 3**  
File Structure of PSC History

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Code *
Practitioner Number *
Reference Number *
Location
Source
Patient Medical Record Number *
Potential Error *
Error Type
Attestation
PRWG Consensus
PSC Consensus
PSC Agrees
PRWG Date
PSC Date *
Staff Date *
Staff Agrees

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The file structure for PSC REFER contains the starred (\*) fields in Table 3 which are automatically transferred when a record is opened during program execution. An additional field identifies to which discipline the problem is being referred. Two text fields are provided for terse descriptions of the issue and the type of response received. A logic field captures whether a response from the referral is expected or not desired. A close date serves to inactivate the referral.

The file structure of the LOOK UP TABLE will not be presented in detail. In brief, it contains location, referral source, disciplines referred to, and attestations for error types. The program calls several files including ADMIT (patient demographics), and PRACTITIONER (including name and PSC practitioner number). These files decrease keyboard entry through the "shop" command of dBMAN and ensure that the practitioner identification number never appears on the computer screen. Mirror image temporary files of PSC HISTORY and PSC REFER are used during

data input/correction to ensure that these critical files are not corrupted during program execution.

### PROGRAM FLOW

The initial screen requests the relevant dates (PRWG, PSC, General Medical Staff) and the initial code. The dates are retained during subsequent input and the Code is automatically incremented during program execution.

The first screen presents input for the Potential Error and the three logical fields (PRWG Consensus, PSC Agrees, PSC Consensus). The logical field of Staff Agrees is defaulted to yes, with subsequent corrections as needed. The geographic location of the potential error and the referral source are chosen from windows utilizing dBMAN's shop command.

The second screen presents the four potential areas of error determination (No Error, More Information, Vigilance, and Medical Judgment). Choosing of a potential error in either Vigilance or Medical Judgment automatically brings up the relevant potential attestations (Table 2) in a window, allowing shopping for the correct designation.

The third screen allows selection of disciplines to whom the quality issue is referred, as well as the fields described above. The common fields between PSC History and PSC Refer are transferred without duplication of keyboard strokes.

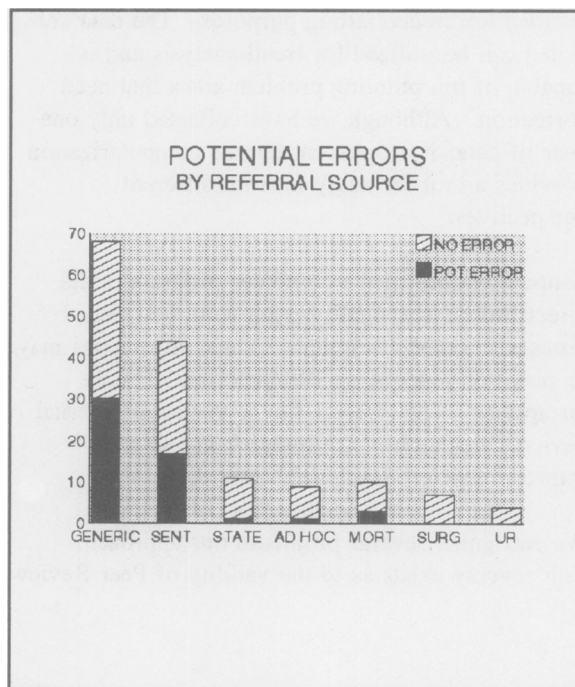
The screens logically follow the encounter form utilized by the practitioners performing Peer Review. The use of the LOOK UP TABLE in windows with dBMAN's shop command materially reduces key strokes and an encounter form can be input in one to three minutes, depending on the number of referrals to other disciplines. Ancillary reports and correction programs are available. The data base can be entered for idiosyncratic query by authorized personnel.

### DATA ANALYSIS

This program has been in operation since January of 1992, thus only a year of computerized data is available. Standard reporting includes the monthly presentations to General Medical Staff, and the periodic upgrading of individual practitioner profiles with a summary report of activity. This latter report will list all determinations, including

those where no error is identified.

The data base can be queried for trend analysis. Figure 1 demonstrates the relationship between source of referral and potential error rate. This type of analysis allows identification of sources that may be under-reporting potential errors. For example, Utilization Review (UR) has submitted only four issues for consideration by PSC yet Utilization Review Nurses are reviewing charts daily. It is apparent that periodic trend analysis can focus on a single practitioner to determine whether a specific error type is being repeated.



Examination of the data base of 1992 demonstrated that in approximately 30% of reviews the three practitioners performing Peer Review were unable to reach consensus as to whether an error could be assigned on chart review. In these cases the members of PSC reached a determination.

### CONCLUDING REMARKS

The Medical Quality Improvement program at Monroe Community Hospital has three underlying goals: (1) Identification of potential quality problem areas in medical practice, (2) Serving as a Risk Management tool, (3) Satisfying the State code and accreditation requirements of the JCAHO. The first two goals can be viewed as a direct benefit to patients, while the third goal is a systems issue

facing all health care facilities.

Unlike Acute Care Hospitals where Quality Improvement programs have access to billing data listing the Diagnostic Related Groups (DRG), Chronic Care Hospitals have to develop alternative methods of securing data. In this paper we present a scheme for classifying potential practitioner errors that is based on the work of Vacanti and Vitez [3] and describe its computerization utilizing micro computer technology.

The computer programs are designed to ease the reporting burden and the maintenance of physician profiles for credentialing purposes. The data collected can be utilized for trend analysis and is capable of pin pointing problem areas that need correction. Although we have collected only one year of data, it is apparent that its computerization provides a tool for analysis from different perspectives.

A novel feature of the computer program is the direct link of any quality issue with the referral process to other disciplines. Thus, any record may or may not generate a referral to one or more disciplines. The referral file serves as an internal device ("tickler file") to integrate the Quality Improvement program with other disciplines.

We recognize several pitfalls in our approach. Controversy exists as to the validity of Peer Review

as a Quality Improvement tool [4]. It is known that when a quality issue is examined, an adverse outcome may color the determination of potential error [5]. Despite these limitations, by maintaining an open Quality Improvement system with Ad Hoc referrals we increase confidence throughout the non-medical disciplines that practitioners are sensitive to improving their practice performance. Furthermore, by developing a standardized lexicon for potential errors, we believe that we can overcome the confounding issue patient outcome.

A recognized problem in our approach is that we have not developed an appropriate denominator to analyze our practitioner potential error rate. An appropriate denominator would be number of patients cared for over the period of time of analysis. The hospital information system is unable to provide us with such data, but we plan to use physician billing data for such analysis in the future.

Our experience extending over two years indicates that aspects of the Medical Quality Improvement program at Chronic Care Hospitals are open to computerization, and that a standardized data base and lexicon can be developed. Such computerization can be visualized as providing direct benefit to patients by encouraging practitioners to review their practice patterns and identifying system issues where the potential error involves others.

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